THE PRE-SETTLEMENT VEGETATION OF THE MT GAMBIER AREA, SOUTH AUSTRALIA

by J. R. DODSON*

Summary

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There are some conflicts as to the nature of the pre-settlement vegetation formations around Mt Gambier and Glencoe. European settlers long ago cleared the areas of their vegetation cover.

Pollen analysis of Brownes Lake sediment reveals that the most likely formation around Mt Gambier consisted of open grassland with perhaps a sparse cover of woody taxa.

Introduction

Crocker (1944) left gaps in his vegetation map in the areas around Mt Gambier and Glencoe, in south-eastern South Australia, as the original vegetation was no longer evident at the time of his survey. Crocker (1944) and Tiver & Crocker (1951) hypothesized that the areas were occupied by lightly wooded grassland, and the trees cleared after settlement. Woods (1862) recorded the vegetation in the Blue Lake crater at Mt Gambier as thickly wooded with several varieties of *Melaleuca*. The vegetation is sparse in the photograph in Hill (1972, p. 108) taken in 1860 and yet Hill when describing an early record (1861) of the first road between Mt Gambier (then Gambiertown) and Port McDonnell on the coast states (p. 109)

> "the route to the 'Bay' was through dense bush country, mud and slush in winter, dust in summer, and tenanted by thousands of kangaroos at all times."

Specht (1972, p. 203) in his vegetation map of the South East simply records the areas around Mt Gambier and Glencoe as cleared.

Brownes Lake occupies portion of one of the craters which formed in the volcanic eruptions at Mt Gambier after 5000 years B.P. (Fergusson & Rafter 1957, Blackburn 1966). It is 4–5 m deep, sits on collapsed volcanic debris and its water surface, like those of the other three crater lakes, is an expression of the regional water table (Bayly & Williams 1964, 1966). Hill (1972) recounts some of the early records of water level changes of the Mt Gambier lakes and it appears that the most spectacular observed were in Brownes and Leg of Mutton Lakes. These are the shallowest and thus changes may have been more obvious. Henty's hut, the first building in the area, is said to have been erected in 1841 on the site of Brownes Lake. Brownes Lake and Valley Lake filled and joined and the new lake reached its maximum depth in the 1890's.

This paper provides data on early vegetation at Mt Gambier. Pollen analysis is an ideal method for tackling this problem as the crater walls are mostly steep-sided and can support little local vegetation. Therefore a significant proportion of the pollen rain is probably regionally derived. Today the craters are heavily exploited for recreation purposes and most of the vegetation within them is introduced. The change from native vegetation should be recorded in the fossil pollen record.

Methods

Before the Brownes Lake core site was selected for investigation, areas of Brownes Lake, Valley Lake and Leg of Mutton Lake were checked for undisturbed sediment. Access to sediment at Blue Lake was impossible with the equipment at hand. A 160 cm sample of peat was collected from Leg of Mutton Lake. The dry periods in Leg of Mutton Lake (Hill 1972, pp. 112-114) which are unfavourable for pollen preservation rendered this core un-

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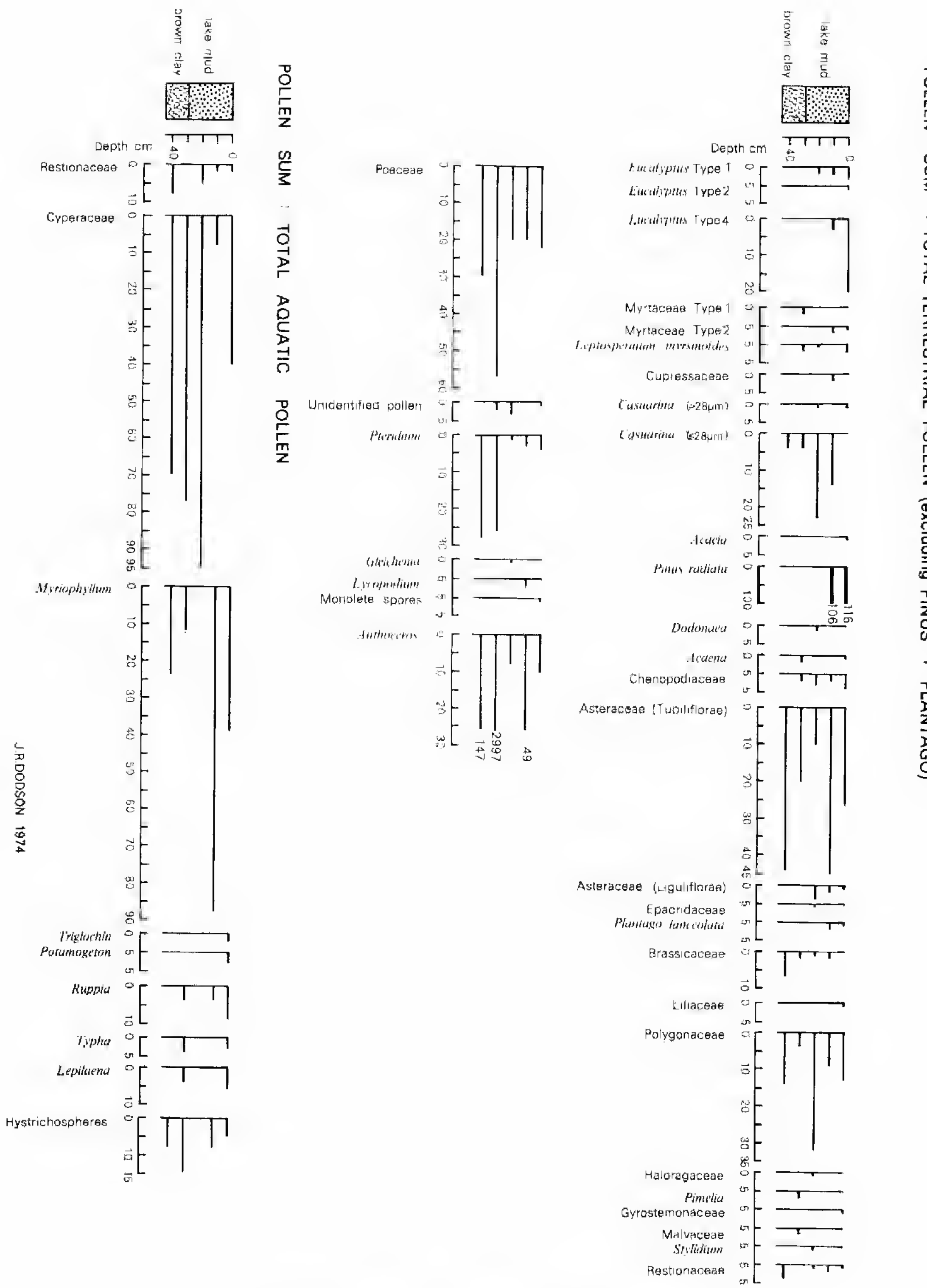

Fig. 1. Pollen diagram for Brownes Lake.

suitable for pollen analysis. No suitable sites were found at the accessible areas in Valley Lake nor in much of the Brownes Lake area.

In February 1974, a 45 cm core was collected with a D-section sampler from the core site on the eastern shore of Brownes Lake. It consisted of 30 cm of black lake mud overlying 15 cm of pale brown (straw coloured) material which was largely clay-sized particles of silica. This is probably reworked volcanic debris. The core was sampled on-site and pollen analysis was carried out in the laboratory using the standard hydrofluoric acid, alkali and Erdtman's acetylosis methods as described by Faegri & Iversen (1964). Residues containing pollen were dehydrated, mounted in silicone oil, and counted until at least 200 pollen grains of woody taxa had been recorded. Relative percentages for terrestrial pollen and spore taxa were calculated against a pollen sum of total land plant pollen excluding the recorded introduced taxa (*Pinus* and *Plantago lanceolata*). Frequencies for aquatic vascular plant pollen and Hystrichosphere remains were calculated against a pollen sum of total aquatic pollen. The results were plotted on a pollen diagram (Fig. 1). Ecological information for taxa in the study area and details of pollen identification have been given by Dodson (1974).

Results and Discussion

The short pollen diagram (Fig. 1) has not been divided into zones, but the presence of introduced taxa divides the diagram into post-settlement (0–10 cms) and pre-settlement phases (20–45 cms).

The pre-settlement phase was dominated by Asteraceae (Tubuliflorae), Poaceae and *Pteridium*, with small numbers of herb pollen. Tree pollen was virtually absent, although small and increasing frequencies of scrub taxa (*Casuarina* ($\leqslant 28 \mu m$)–probably *C. paludosa*, and Myrtaceae Type 1–*Leptospermum juniperinum* and *Leptospermum myrsinoides*) were obtained. Assuming that regional pollen dominates, then the assemblage most likely represents open (treeless) vegetation in the region with a heath fringe around the lake. The local vegetation was mainly *Anthoceros*, Cyperaceae, and *Myriophyllum*, representing a shallow water environment at the core site. This pollen assemblage tends to confirm the Crocker hypothesis that trees were few, rather than the early report recounted by Hill, unless the scrub described by the latter consisted of low pollen producers such as *Banksia* or *Acacia*. There is no evidence in the form of remnant vegetation to support this. The organic and pollen and spore content of the sediment was low (except for *Anthoceros* spores which must have been derived locally), suggesting either slow sedimentation during alternating wet and dry conditions (which could result in the loss of pollen through oxidation) or fairly rapid in-wash of inorganic material from the steep crater walls. On the evidence presented here it is not possible to favour either explanation.

The post-settlement phase of the pollen diagram is dominated by Poaceae, herbs and *Pinus radiata*, and also shows increasing *Eucalyptus* frequencies. *Anthoceros* and Cyperaceae decrease in importance and *Myriophyllum* dominates the aquatic spectra, indicating a change to deeper water at the core site. Since the core site is near the edge of the lake, it follows that water would not be deep there until the level rose above its present position. Since the rise accompanies the increase in pollen of exotic plants, it seems likely that the rise is the one recorded for the latter part of the 19th Century when Brownes Lake and Valley Lake were joined. The increase in *Eucalyptus* pollen is undoubtedly due to the plantings established in the craters for recreation facilities and the wildlife reserve and not to any change in the native vegetation.

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